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JOURNAL OF

THE NEW ENGLAND BOTANICAL CLUB

Vol. 23. November, 1921. No. 275.

GRAY PINE AND ARBOR-VITAE.

Arthur Stanley Pease.

In an interesting article in Rhodora, xxi. 41–67 (1919), Professor Fernald has stated that *Pinus Banksiana* is confined to acid soils, *Thuja occidentalis* chiefly to basic soils, reaching its maximum development and its outlying stations only in positively calcareous areas. A railway trip taken in June, 1921, in a region not very well known botanically, gave the writer an opportunity to make from the car windows some observations upon these two conspicuous species, and his notes may be worth concise presentation as evidence supplementary to that offered by Professor Fernald.

Across the southern part of the upper peninsula of Michigan, from Gladstone to Manistique, barrens with *Pinus Banksiana* (and scattered *Pinus resinosa*) were seen, but there was no *Thuja* near these species. Along the line of the Algoma Central and Hudson Bay Railway, from Sault Ste. Marie, Ont., northward for nearly three hundred miles I made the following notes, the mileages given being those from Sault Ste. Marie. Near Frater (mile 102) Gray Pine was reported to me by an old resident as being very scarce; he had seen but two trees of it in an experience of many years. Near O'Connor (mile 126) the first trees of the species visible from the railroad began to appear; beyond Agawa (mile 131) they became common, continuing near Tabor (mile 141), and largely found as a second growth after fires. Beyond Limer (mile 156) there are barrens with *Vaccinium pennsylvanicum* and its var. *nigrum* and Gray Pine. During all these observations of Gray Pine which I have mentioned no *Thuja* was seen anywhere in the neighborhood. Near Hawk Jc. (mile 165), however, both are found,

Thuja in bogs, *Pinus Banksiana* on dry ridges, sometimes not more than two hundred feet from the *Thuja*, and north of Alden (mile 173) the two were seen within twenty-five feet of one another, but it was noteworthy that the cedars were on a shore, close to water, and the pine on a gravelly ridge. Beyond Dreany (mile 182) the pine descends into bogs, in company with *Larix*, but the character of the soil in these is betrayed by the abundant presence of *Ledum groenlandicum* and no *Thuja* was seen in them. A little farther north the pine forms thick stands upon the drier ground, but soon after disappears. Between Franz (mile 195) and Hearst (mile 296) there are large calcareous areas, for example at Gray (mile 229) and Akron (mile 233), with such characteristic plants as *Valeriana uliginosa* and *Lonicera involucrata* and, of course, *Thuja*, and along this stretch, as well as from Hearst eastward for one hundred and thirty miles to Cochrane, I saw no Gray Pine. East of Cochrane, however, on the line of the National Transcontinental Railway, I was able to make some further observations (the mileages being this time those from Quebec). East of Norembega (mile 559) the first Gray Pine appeared, and near Lake Abitibi (about mile 531) young trees of it grew infrequently by the railroad track, as though adventive. *Thuja* was also seen, but in bogs, and the two were not seen together. East of Balkam (about mile 515) was Gray Pine unaccompanied by *Thuja*; east of Authier (mile 470) it was found in company with much *Kalmia angustifolia*; about Amos (mile 433) it was abundant, but always without cedars. Its presence or absence in a distance of two hundred miles which I passed after dark I cannot describe, but the next day I saw it near Ferguson (mile 181), and near La Tuque (mile 129) it and *Pinus resinosa* were seen on ridges, with *Thuja* in low swampy ground.

Naturally these observations lose much of their value without the control of careful soil tests, which in a trip of this sort were obviously impossible. Yet it may be safely be stated, so far as my observations go, that whenever *Pinus Banksiana* and *Thuja* were both present at one locality there was visible, even at a hasty glance from the train, some decided difference in their habitats. That this difference, as I have described it at Hawk Jc. and Alden, depended upon something more than a mere question of moisture may also be inferred from the fact that the pine was by no means limited to dry ridges, as the station which I have described near Dreany well showed. *Pinus Banksiana* will apparently grow either upon dry sandy (or rocky) barrens or in wet

peat bogs, but not in the soil conditions necessary for *Thuja*, and *Thuja*, as Professor Fernald well remarks in his article, will grow in habitats either boggy or well drained, but not in the soil conditions, whatever these may be, required by *Pinus Banksiana*. To this extent, then, my observations appear to corroborate the conclusions of Professor Fernald.

URBANA, ILLINOIS.

NOTES FROM THE WOODS HOLE LABORATORY,—1921.

I. F. LEWIS AND W. R. TAYLOR.

(Plate 133)

PLATYMONAS SUBCORDIFORMIS (Wille) Hazen.—In the summer of 1917 a unicellular green organism was found in a small tide pool on Black Rock, near the entrance to New Bedford Harbor. It was considered to be a new American species of the genus *Platymonas* West[1] until Dr. Tracy E. Hazen established and called attention to the fact that it is identical with Wille's *Carteria subcordiformis*.[2] Dr. Hazen's account is reproduced at the end of this note.

The organism has been found in each succeeding summer in the same locality, and Dr. Hazen records its occurrence elsewhere in Massachusetts and in New York, as well as in England and Norway. At the Black Rock station it has been consistently abundant in certain pools. The rock is a haunt of gulls, and the water containing the *Platymonas* is at times so fouled with excrement as to give off a decidedly unpleasant odor. It seems, like certain other Chlamydomonads, to flourish best in the presence of organic pollution. It can endure a range of salinity from that of almost fresh, or quite fresh (Wille), water to that of sea water.

The cells are small, varying in length from 13 to 17 μ, in breadth from 7 to 8 μ, in thickness from 4 to 5 μ. In surface view (pl. 133, figs. 1–3) the cells are oval and flattened. One face is convex, while the other is nearly flat (fig. 4).

The usual vegetative phase is actively motile with the anterior end

[1] West, G. S. Algological notes XVIII–XXIII. Journal of Botany **54**: 1–10. 1916.
[2] Wille, N. Algologische Notizen IX. Ueber eine Art der Gattung *Carteria* Diesing. Nyt. Mag. Naturvid. **41**: 89–94, Taf. 3. 1903.

directed forward. There are four cilia, which are inserted close together in a pit on the anterior end. One lip of the pit is higher than the other. A large stigma occurs in the posterior third of the cell and on its flat face. The chloroplast is single and is usually cup-shaped or sometimes cylindrical. At times it is seen to be two or four lobed anteriorly, but posterior lobes similar to those of *P. tetrathele* West were not observed. The four mammillate anterior projections of the cell of *tetrathele* are also usually lacking, though in cells which have ceased to move the end view may sometimes be quadrate.

The pyrenoid in face view is cup-shaped, though it seems spherical when viewed from the side. Starch grains are found around the pyrenoid and at times elsewhere within the chloroplast. The single nucleus occurs in the cavity of the chloroplast.

The cell wall is a delicate membrane of cellulose, visible with difficulty in the motile cell, though easily observed in fixed material or in reproducing individuals.

Reproduction (figs. 5–19) is exclusively asexual. A vegetative cell loses its cilia and the contents divide into two by constriction. Division may be either longitudinal, oblique, or transverse. The first indication of division is an increase in the size of the cell followed by the splitting of the chloroplast. The stigma then divides unequally, the two parts soon separating. After this the protoplast divides and last the pyrenoid. The peculiar shape of the pyrenoid seems to be due to its mode of division. Fission into equal halves takes place, from which result two shallow cups. The edge of each cup grows upward and inward as if to form a hollow sphere, but the process is incomplete and a deep cup with a narrow opening results.

In its structure and mode of division *Platymonas subcordiformis* shows a remarkably close resemblance to the zoospores of *Prasinocladus subsalsa* (Davis) Wille. The resemblance is so striking as to amount almost to identity. It would be difficult to distinguish between the two if they were mounted in the same drop. The size, the thin membrane-like wall, the four cilia of the same length as the cell, the conspicuous stigma, the plane of division varying from longitudinal to oblique or transverse, the peculiar cup-shaped pyrenoid are all identical. The zoospore of *Prasinocladus* has not been described as flattened, but this point is not easily observed and may have been overlooked as it was when Wille described *Carteria subcordiformis*.

The chloroplast may be either lobed or a continuous cylinder in both forms. Furthermore, bothare catharobic, requiring organic adjuvants to the brackish water in which they live. There are two notable differences. First, *Prasinocladus* has been found only in late fall or winter in this locality, while *Platymonas* has been observed only in summer. Second, *Platymonas* is free swimming, while the cells of *Prasinocladus* are united to form a gelatinous colony.

There is here a problem still to be solved, but to the writer the probabilities strongly favor the view that *Platymonas* is the motile stage, *Prasinocladus* the "Palmella" stage of the same organism.

Opposed to this view is the negative result of culture. *Platymonas* was isolated on agar and kept for over twelve months under continuous observation. Samples were removed and cultivated in sea water under varying conditions. The unicellular condition was persistently maintained and the pseudofilamentous habit of *Prasinocladus* was never assumed. Observations under natural conditions will be required before a final judgment can be given.—I. F. Lewis.

Platymonas **subcordiformis** (Wille) Hazen, comb. nov. *Carteria subcordiformis* Wille, Nyt. Mag. f. Naturvid. **41**: 93, 94. 1903. It may be worth while to record briefly the history of the identification of this species. During a visit to Woods Hole in August 1919 Dr. Lewis conducted me to his station for *Platymonas* at Black Rock, where abundant material was secured. Later in the season I found the same species in less amount at Twin Island, Pelham Bay, New York. Early in the summer of 1920, while spending a week at Aalesund, Norway, where Professor Wille had discovered several interesting Chlamydomonads in 1902, I collected a form which was at once recognized as very similar to, if not identical with, that to which Dr. Lewis had introduced me. I was also struck with the resemblance of this form to *Carteria subcordiformis*, especially when comparison was made with the original drawings of the latter a few days later. Upon examination of my freshly collected material, Professor Wille readily identified it with his species, which appears not to have been reported since the original discovery. I later found the same species at Cullercoats, near Newcastle-upon-Tyne, and at Plymouth, England. In September 1920 I again collected the species at Nahant, Mass., and also at Fort Phoenix, Fair Haven, Mass., not far distant from the station on Black Rock, and again at Pelham Bay. I have

had living material from these four stations and from the three European stations for simultaneous examination, and after careful study am convinced that it all belongs to one species I had hoped to find at Plymouth the type species, *Platymonas tetrathele* West, but I could only discover there *P. subcordiformis* and a new species, quite different from either, which I had also found at Aalesund.

It may appear strange that the compressed form of the cell, which is the chief character upon which this species is to be placed in the genus *Platymonas* rather than in *Carteria*, was overlooked by Wille. But at certain times the narrower diameter of the cells is so little presented to view as to be very inconspicuous. My own first impression was that this species exhibited hardly sufficient differences to warrant its removal from the genus *Carteria*, but extended observation during more than a year has convinced me that it is very distinct, and that it is very desirable to maintain the genus *Platymonas* West. Wille has also recorded *Carteria subcordiformis* as a freshwater species, while in all the seven stations where I have collected it the water has been brackish; but in these small rock hollows on the shore the salinity of the water undoubtedly varies considerably. I have found that cells may be transferred successfully to fresh water or to clean sea water.—Tracy E. Hazen.

Asterococcus superbus (Cienk.) Scherf.—This beautiful member of the Protococcales was found in abundance in 1920 and 1921 among sphagnum along the shores of Sheep Pond, Cuttyhunk Island. This is its first recorded occurrence for North America, though Smith[1] has found *Asterococcus limneticus* in Wisconsin.

The method of escape of the spores, not hitherto noted, is indicated in fig. 26. The lamellae at a point opposite the clear spot which is the point of origin of the cilia soften and swell, finally dissolving. The outermost layer is first involved, then the others progressively until the spore is free to escape.—I. F. Lewis.

Anabaena spiroides var. crassa Lemm.—On July 30, 1920, the writer noted a considerable "bloom" on North Head of Hummock Pond, Nantucket, Massachusetts. This on examination proved to be a mixture of *Clathrocystis aeruginosa* (Kütz) Henfr., and an *Anabaena* notable for the regularity of its spiral trichome, and for having round

[1] Smith, G. M. Phytoplankton of the inland lakes of Wisconsin. Madison. 1920.

spores. Considerable material was obtained by the kindness of Dr. Alice M. Russell, and some was sent to Dr. Gilbert M. Smith, who identified the form as *Anabaena spiroides* var. *crassa* Lemm., noting

Fig. 1. *Anabeana spiroides* var. *crassa*. A, Trichome showing three heterocysts but no spores. × 300. B, C, D, Portions of trichome showing spores and heterocyst. × 650.

however that the spores of the Nantucket material are round, whereas those of this variety of *Anabaena spiroides* are typically elongate. The measurements of the Nantucket form are: trichome 11.5μ average diameter, heterocysts 13μ diameter, and spores thick and smooth-walled, diameter 22μ. Dr. Smith has reported *Anabaena spiroides* var. *crassa* as occurring in Wisconsin lakes.—W. R. Taylor.

Mougeotia tenuis (Cleve) Wittrock. This distinct form was found with zygospores in a small pond on Pasque Island July 6, 1921.

Mougeotia parvula Hassall. Abundant material of this species in all stages of conjugation appeared in a drinking fountain in Woods Hole, July 1921.

Bryopsis hypnoides Lamx.—In a specimen of *Bryopsis hypnoides* Lamx., collected from a float in the harbor near the laboratory, a great many of the branches were found to contain gametes. All of the protoplasm of the branch goes into the formation of the gametes, which escape through several pores in the cell walls. The passage out was moderately rapid. On the slide under the microscope, the female gametes soon settle down and become motionless, whether fertilization occurs or not. The males are more active, settling down later. Some branches contained both male and female gametes. In such cases the number of female gametes is greater. Other branches apparently produce only one kind.

The male gametes are very small and biciliate, the cilia being of equal or possibly subequal length. The chloroplast is massed in the

posterior part of the cell and is slightly orange in color, the rest of the cell being colorless. Cilia are directed forward in swimming.

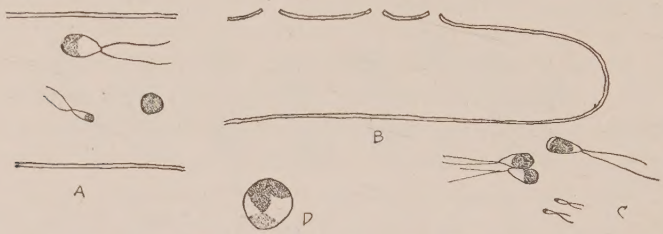


Fig. 2. *Bryopsis hypnoides*. ×650. A, Male and female gametes in portion of branch. B, Exit pores in side of branch. C. Male and female gametes. D. Germinating zygote.

The female gametes are more egg-shaped and much larger than the males. In structure they are similar save for a slight yellowish cast to the chloroplast.

On fusion the pair settle down and zygotes of irregular shape are formed, which show some metabolic movements.

The phenomena of germination were not observed except for an increase in the size of the zygote.

The Bryopsidaceae are prevailingly dioecious, so that the monoecism observed in *Bryopsis hypnoides* is exceptional in the family. The length of the cilia is also exceptional in this species. It varies from slightly longer than, to more than twice as long as, the cell.—J. B. Lackey.

Ectocarpus Mitchellae Harv. var. **parva** n. var. Thallus caespitose, attached, 8–12 mm. tall. Interlacing decumbent basal filaments giving rise to the primary erect filaments (of 22μ average diameter) seldom branched. The few lateral secondary branches scattered, largely on the distal half of the primary, with average diameter 16 μ at the base, and produced into short hairlike tips. Plurilocular sporangia sessile erect on the upper side of the secondary branches, cylindrical, obtuse, composed of a few large cells each producing one round or slightly oval motionless megaspore. Sporangia average 60 μ long by 16 μ broad and spores 12 μ in diameter.

During the last week of July, 1919, the collectors of the U. S. Fish-

eries Commission brought into the laboratory at Woods Hole, Massachusetts, a specimen of the Loggerhead Turtle, *Thalassochelys caretta* from Vineyard Sound. Tufts of an alga on the carapace were referred to the writer for study. He is much indebted to the late Mr. F. S. Collins for helpful suggestions with regard to its relationships.

The form was found to be closely related to *Ectocarpus Mitchellae* Harv. (*E. virescens* Thuret) as indicated by its sporangial characters and certain striking features of its vegetative habit. It differs mainly in having the primary erect filaments sub-simple, not abundantly branched, and in the smaller size of the vegetative filaments and the sporangia. The fresh material showed abundant stages in the development of the sporangia, the extrusion of the spores and their germination and growth. The decumbent filaments produced lobed haptera, and the cells of the erect filaments occasionally sent out corticating down-growths which sometimes reached to the substratum. The filaments and branches have a limited apical growth soon succeeded by intercalary growth from near the base. In all these growth characters it resembles *E. virescens* Thuret as described by Sauvageau (Jour. de Bot. Vol. 10, 1896). The non-motile spores showed a very distinct wall, and no evidence could be found that they had the power of movement at any time.

On July 19th, 1921, Dr. I. F. Lewis collected tufts of a brown alga from a piece of timber washed ashore on the island of Cuttyhunk, Massachusetts, which on examination proved to be the same variety as that obtained two years before. This material also showed abundant sporangia and sporelings and was in more luxuriant condition than the first lot. The fact that both collections of the alga were from drifted objects makes it impossible to tell the source of the material, but the unworn appearance of the timber would seem to indicate that it had not travelled very far and that this *Ectocarpus* might be expected along the eastern seaboard at no great distance south of Cape Cod.—W. R. Taylor.

Baptisia bracteata (Muhl.) Ell. is listed in the floras as having a western distribution, coming east only to Michigan. About the end of July 1919 one of the botanical students at the Marine Biological Laboratory brought in to the department a specimen which proved to be this plant. Investigation showed that it had appeared along the

railroad north of Woods Hole, between there and Falmouth. It seems probable that it was a quite recent introduction and the vigor of the plants and the large racemes of hairy pods seemed to point to its establishment in this neighborhood, but the present season shows none of the original colony remaining.

Search in the Herbarium of the University of Pennsylvania produced no specimen from the East, and in that of the Philadelphia Academy of Natural Sciences material from the Southern States and one specimen from Illinois were the nearest records. An inquiry at the Gray Herbarium at Harvard University brought the information that the nearest localities which they had represented were Illinois and South Carolina, and the New York Botanical Garden reported nothing from the Central Atlantic or New England States. As there seems to be no published record of this plant from New England, this locality then supported the most northeasterly colony of the species yet reported.

Specimens showing immature pods have been placed in the Herbaria of the Marine Biological Laboratory and the University of Pennsylvania.—W. R. Taylor.

Explanation of Plate 133

Figs. 1-19, *Platymonas subcordiformis*. × 800.
Figs. 1–3, Vegetative cells, face view.
Fig. 4, Side view.
Figs. 5–7, Stages in cell division.
Figs. 8–17, Longitudinal and oblique divisions.
Fig. 18, Longitudinal division, end view showing lobed chloroplast.
Fig. 19, Transverse division.
Figs. 20–24, *Ectocarpus Mitchellae* var. *parva*.
Fig. 20, Spores from living material showing chromatophores. × 730.
Fig. 21, Vegetative cell from primary filament. × 730.
Fig. 22, Main filament and branch with sporangia and sporelings. ×235.
Fig. 23, Branch showing mature sporangium discharging spores, × 235.
Fig. 24, Main filament and branches with maturing sporangia. × 235.
Fig. 25, *Asterococcus superbus*, vegetative colony. × 365.
Fig. 26, *Asterococcus* zoospore, showing mode of release. × 365.

THE GRAY HERBARIUM EXPEDITION TO NOVA SCOTIA, 1920.

M. L. Fernald.

(*Continued from p. 247.*)

S. SERICEA Marsh. Apparently rare in western Nova Scotia. YARMOUTH CO.: sandy and cobbly beach of Fanning Lake, Carleton.

* S. ROSTRATA Richardson, var. CAPREIFOLIA Fernald, RHODORA, xvi. 177 (1914). DIGBY CO.: small trees in woods and thickets at margin of Lily Lake, Sandy Cove.

** S. HUMILIS Marsh., var. KEWEENAWENSIS Farwell, Mich. Acad. Sci. Ann. Rep. vi. 206 (1904). Most if not all material from the Maritime Provinces and Newfoundland belongs to this northern variety, characterized by broadish often obovate leaves with a satiny or lustrous velvety pubescence. It is widely dispersed in Nova Scotia in both dry and wet habitats.

** *S. Smithiana* Willd. See Fernald & Wiegand, RHODORA, xii. 104, 137 (1910). Naturalized on clay bank by the sea, Baddeck.

* *S. purpurea* L. Very abundantly naturalized by wet roadsides about Yarmouth. See p. 95.

MYRICA CAROLINENSIS Mill. Abundant in the silicious regions, but rare or perhaps largely absent from Digby to Truro.

* BETULA LUTEA Michx. f., var. ALLEGHANIENSIS (Britton) Ashe, Bull. Charleston Mus. xiv. 11 (1918). Wooded lake-margins of Yarmouth and Digby Cos. apparently as common as typical *B. lutea*. Macoun's records of *B. lenta* may be based on var. *alleghaniensis*.

* B. PAPYRIFERA Marsh., var. CORDIFOLIA (Regel) Fernald. Occasional in Yarmouth Co.

OSTRYA VIRGINIANA (Mill.) K. Koch. Not seen west of Annapolis Co. See pp. 137, 170.

** ALNUS INCANA (L.) Moench, var. HYPOCHLORA Call. Jahresb. Schles. Ges. lxix. pt. 2: 79 (1891). Leaves green beneath, slightly pubescent or glabrate. YARMOUTH CO.: thicket bordering Sloane Lake, Pleasant Valley.

Urtica dioica L. Waste ground about towns; occasional in Yarmouth and Shelburne Cos.

LAPORTEA CANADENSIS L. HANTS CO.: alluvial woods along Five-Mile River. See pp. 137, 170.

ARCEUTHOBIUM PUSILLUM Peck. Apparently common throughout the province. See p. 97.

** *Rumex alpinus* L. YARMOUTH CO.: abundantly naturalized in a springy field, Rockville. See p. 107.

R. PALLIDUS Bigel. Gravelly sea-beaches, Yarmouth and Shelburne Cos. See p. 155.

** *R. obtusifolius* L., var. *sylvestris* (Lam.) Koch. Lower leaves oblong-lanceolate, acute. Digby Co.: roadside ditches, Sandy Cove. Naturalized also about Charlottetown, Prince Edward Island, and Bay of Islands, Newfoundland.

R. maritimus L., var. fueginus (Phil.) Dusén. See St. John, Rhodora, xvii. 81 (1915). Queens Co.: brackish sands, scarce, Central Port Mouton and at mouth of Broad River. See p. 158.

R. Acetosa L. Thoroughly naturalized in damp fields and swales, Yarmouth and Digby Cos. and occasional elsewhere. See pp. 95, 107.

Polygonum lapathifolium L. Sp. Pl. i. 360 (1753) as to name-bringing synonym. *P. pennsylvanicum*, var. Curt. Fl. Lond. i. t. 25 (1777). *P. lapathifolium*, var. *pecticale* Stokes in With., Bot. Arr. ed. 2, i. 412 (1787). *P. lapath.*, var. *maculatum* Sibth. Fl. Oxon. 129 (1794). *P. nodosum* Pers. Syn. i. 440 (1805). *Persicaria maculata* (Sibth.) S. F. Gray, Nat. Arr. Brit. Pl. ii. 270 (1821). *Peutalis nodosa* (Pers.) Raf. Fl. Tell. iii. 14 (1836). *Pol. lapath.*, var. *nodosum* (Pers.) Wein. Enum. Petrop. 42 (1837). *Persicaria nodosa* (Pers.) Opiz, Sezn. 72 (1852). *Pol. lapath.*, subsp. *maculatum* (Sibth.) Dyer & Trimen, Journ. Bot. ix. 36 (1871). *Pol. maculatum* (Sibth.) Babington, Man. ed. 7, 301 (1874).—Local weed in cultivated land, Yarmouth.

I see no reason to restrict the name *P. lapathifolium* L. to *P. scabrum* Moench, as is done by some European authors. Admitting that the Linnean species was a mixture of that and the purplish-flowered plant separated as *P. nodosum* Pers., we have two essential facts which lead to the retention of *P. lapathifolium* for *P. nodosum*. Linnaeus's account was as follows:

"*Lapathifolium* 6. POLYGONUM floribus pentandris semidigynis, staminibus corollae regulari aequalibus.
Persicaria floribus pentandris digynis, corolla regulari staminibus aequali. *Wach. ultr.* 257.
Persicaria florum staminibus quinis semidygnis, stylo bifido corollae regulari aequantibus. *Hort. cliff.* 42.
Persicaria major, lapathi foliis, calyce floris purpureo. *Tournef. inst.* 510. *Raj. suppl.* 119.
Persicaria Hydropiper. *Lob. ic.* 315.
Habitat in Gallia."

From this it should be quite clear that Linnaeus derived his specific name from *Persicaria major, lapathi foliis, calyce floris purpureo* of Tournefort and of Ray. On reference to Tournefort we find nothing but the brief description above quoted, but Ray in his full account says "*Calix* purpurascens lineam unam longus est," which better describes the shorter perianth of *P. nodosum* than the longer, usually

greenish perianth of *P. scabrum;* for in *P. nodosum*, the achene of which about equals the perianth, the achene is correctly described by Rouy as "petits (2 mm. sur 1½)" while the green-flowered *P. scabrum* has "achaînes très grands (3 mill. de long sur 2½)". In other words, *Persicaria major, lapathi foliis, calyce floris purpureo* of Tournefort and of Ray, the plant from which Linnaeus directly took the specific name, has not only the purple flowers but the small calyx of *P. nodosum* Pers.

Again in the splitting up of the complex *P. lapathifolium* of Linnaeus the first element described under a new name was *P. Persicaria* * *tomentosum* Schrank (1789) or *P. scabrum* Moench (1794) or *P. pallidum* With. (1796). These all antedated by many years *P. nodosum* Pers. (1805) and by the very sound "doctrine of residues" the removal from the complex first of *P. scabrum* left as *P. lapathifolium* the plant with small purplish flowers, the *Persicaria major, lapathi foliis* of Tournefort and of Ray. Thus by both these principles we arrive at the same conclusion, that the name *P. lapathifolium* belongs to *P. nodosum* Pers. not to *P. scabrum* Moench.

P. LAPATHIFOLIUM, var. SALICIFOLIUM Sibth. Fl. Oxon. 129 (1794). *P. incanum* Willd. Enum. Pl. Berol. 429 (1809), not F. W. Schmidt, Fl. Boem. iv. 90 (1794). *Persicaria salicifolia* (Sibth.) S. F. Gray, Nat. Arr. Brit. Pl. ii. 270 (1821). *Pol. lapathifolium*, var. *incanum* (Willd.) Koch, Syn. 617 (1837). *Pol. nodosum*, β. *incanum* (Willd.) Ledeb. Fl. Ross. iii. 521 (1849–51). *Pol. tomentosum*, var. *incanum* Robinson & Fernald in Gray, Man. ed. 7, 360 (1908), mostly, not *P. tomentosum*, var. *incanum* (Schmidt) Gurke, Pl. Eur. ii. 121 (1897) which is apparently only a minor form of *P. scabrum* Moench = *P. tomentosum* (Schrank) Gurke. *Pol. nodosum*, forma *salicifolium* (Sibth.) Moss, Cambr. Brit. Fl. ii. 117 (1914).—Damp sands and pond-margins, frequent in Yarmouth and Shelburne Cos.

P. SCABRUM Moench, Meth. 629 (1794). *P. lapathifolium* L. Sp. Pl. i. 360 (1753), in part. *P. pennsylvanicum* Huds. Fl. Angl. 148 (1762); Curtis Fl. Lond. i. t. 24 (1777); not L. *P. Persicaria* **tomentosum* Schrank, Baier. Fl. i. 669 (1789). *P. incanum* F. W. Schmidt, Fl. Boem. iv. 90 (1794). *P. pallidum* With. Bot. Arr. ed. 3, ii. 381 (1796). *P. tomentosum* (Schrank) Gurke, Pl. Eur. ii. 121 (1897); Robinson & Fernald in Gray, Man. ed. 7, 360 (1908); not Willd. *P. tomentosum*, var. *incanum* (Schmidt) Gurke, Pl. Eur. ii. 121 (1897). *Persicaria tomentosa* (Schrank) Bicknell, Bull. Torr. Bot. Cl. xxxvi. 453 (1909).—Damp sandy and gravelly shores where seemingly indigenous, and cultivated land as a weed.

* P. MUHLENBERGII (Meisn.) Watson. YARMOUTH Co.: dominant on a wet savannah bordering Butler's (Gavelton) Lake, Gavelton. See p. 166.

* P. ACRE HBK. Including var. *leptostachyum* Meisn. Common, apparently throughout the province.

** P. ROBUSTIUS (Small) Fernald, p. 147. YARMOUTH Co.: cold brook in sphagnous swale by Salmon (Greenville) Lake; boggy swale by Tusket (Vaughan) Lake, Gavelton; peaty and muddy dried-out pond-hole near head of St. John Lake, Springhaven; in running water, thicket at margin of Randel Lake, Argyle. See pp. 146, 147, 149, 155, 166, 168.

* P. HYDROPIPEROIDES Michx. Swales, savannahs and peaty shores, valleys of the Salmon and Tusket Rivers, Yarmouth Co.

** P. HYDROPIPEROIDES Michx., var. **digitatum**, n. var., planta 1–1.5 m. alta; foliis lineari-lanceolatis attenuatis plerumque 1.3–2 dm. longis; spicis densis 0.5–1 cm. crassis ad apices ramulorum plerumque aggregatis.

Plant 1–1.5 m. high; leaves linear-lanceolate, attenuate, mostly 1.3–2 dm. long: spikes densely flowered, 0.5–1 cm. thick, mostly crowded at the tips of the branches.—NOVA SCOTIA: boggy savannah bordering St. John Lake, Springhaven, Yarmouth Co., October 8, 1920, *Fernald* & *Linder*, no. 21,093 (TYPE in Gray Herb.).

Differing from typical *P. hydropiperoides* in its great height, very elongate leaves, thick crowded spikes and very late flowering. For further notes see p. 168.

P. RAII Babington. See Fernald, RHODORA, xv. 72 (1913). Damp sands and gravels of the coast from Shelburne Co. to Cape Breton. See pp. 150, 158, 165.

P. ACADIENSE Fernald, RHODORA, xvi. 188 (1914). To the original station at Grand Narrows should be added: gravelly beach of Great Bras d'Or, Kidstone Island, very scarce. See pp. 134, 165.

* P. FOWLERI Robinson, RHODORA, iv. 67 (1902). *P. buxifolium* Nutt. in Bong. Veg. Ins. Sitcha, 161 (1832), *nomen seminudum*, as to Sitka plant only, not as to synonymy nor apparently as to reference to Nuttall's specimen; not Bieb. *P. aviculare*, ε. *buxifolium* Ledeb. Fl. Ross. iii. 532 (1849–51) as to Sitka plant only. *P. littorale*, β. *buxifolium* Meisner in DC. Prodr. xiv. 98 (1856) as to description and plant. *P. maritimum* Fowler, Prelim. List Pl. N. B. 53 (1885), not L. (1753). *P. littorale sitchense* Small, Mem. Dept. Bot. Columbia Col. i. 102 (1895).—QUEENS Co.: with *P. allocarpum* on damp sand-flats, Central Port Mouton. VICTORIA Co.: gravelly beaches of Great Bras d'Or, Baddeck and Kidstone Island. Previously collected by J. R. Churchill on the beach at Aspy Bay.

The name *P. Fowleri* is here retained as the first adequately defined *specific* name, the name *P. buxifolium* Nutt. being open to very serious doubt. In the first place Nuttall did not publish his *P. buxifolium*, a species which Bongard ascribed to him as if it had been published. Bongard's publication was as follows:

"133. *Polygonum buxifolium Nutt.*! P. aviculare β latifolium Michx. Fl. Bor. am. I. p. 237.
Polygono aviculari simillimum; sed floribus semper *pentandris* distinctum. Specimina Nuttalliana exacte cum Sitchensibus conveniunt."

From this it is evident that Bongard had a plant from Sitka which he thought to be like Nuttall material which had been called *P. buxifolium* and which was identified with *P. aviculare* β. *latifolium* Michx., and it is noteworthy that Bongard's descriptive note was borrowed directly from Nuttall and the name *buxifolium* from Michaux's description of *P. aviculare β. latifolium.* Thus, in the original publication of β. *latifolium* from "Kentucky et regione Illinoensi," a plant which seems to have been *P. erectum* L., Michaux said "foliis lato-ovalibus, obtusis: quasi *buxifolium* [italics mine]." —Michx. Fl. Bor.-Am. i. 237 (1803). Later, in 1818, in his *Genera*, i. 254, Nuttall described *P. aviculare* as having "flowers octandrous" and maintained *β. latifolium* [= ? *P. erectum*] with "leaves broad oval, obtuse, flowers pentandrous, stem adscendent." As a matter of fact, however, the stamens of *P. aviculare* vary from 5–8, so that Bongard's descriptive phrase, "Polygono aviculari simillimum; sed floribus semper *pentandris* distinctum," borrowed directly from Nuttall's description of a plant of Kentucky and Illinois and applied to a maritime plant of Sitka, does not differentiate the Sitkan plant and the name *P. buxifolium* at best is a *nomen seminudum* based upon a complete misconception. The Sitka material, called by Bongard *P. buxifolium*, has little in common with *P. erectum* or any other species of "Kentucky et regione Illinoensi" but, as shown by a sheet preserved in the Prodromus herbarium at Geneva, is exactly *P. Fowleri*, a maritime plant of the Gulf of St. Lawrence, Nova Scotia and eastern Newfoundland and of the shores of the North Pacific from Siberia and Alaska to Washington. The first *real description* of this Sitka plant was that of Meisner in DeCandolle's Prodromus, where a definite characterization was given—a diagnosis which applies equally well to the eastern material of *P. Fowleri.* Meisner's description, published in 1856, was as follows:

P. LITTORALE, "β. *buxifolium* (Ledeb.! fl. ross. 3, p. 532, sub *P. aviculari*), caulibus abbreviatis, foliis lineari-oblongis obtusis attenuato-subpetiolatis subeveniis, axillis 1–2-floris, achaenio calycem paulo superante subnitido minute punctato obsolete striato. In ins. Sitka (Eschscholtz!)."

This diagnosis of Meisner's, as stated, was based upon the Sitka material and accurately describes it, the earlier published phrases under the names *P. buxifolium* and *P. aviculare*, var. *buxifolium* having been borrowed without change from Michaux's and Nuttall's descriptions of *P. aviculare*, β. *latifolium* from Kentucky and Illinois, a plant which is certainly not conspecific with Eschscholtz's Sitkan plant. It is, therefore, quite clear that the latter plant was not truly characterized until Meisner's publication of it as a variety and that the first specific name clearly belonging to the plant is *P. Fowleri*.

* P. ALLOCARPUM Blake, RHODORA, xix. 234 (1917). Characteristic of sea-beaches and tidal sand-flats from Digby Co. to Queens Co. See pp. 151, 163.

* *P. cuspidatum* Sieb. & Zucc. Roadsides and waste ground, Yarmouth and Halifax.

** *P. polystachyum* Wall. A tall perennial of the gardens, with very long caudate-tipped and truncate-based leaves. Beginning to spread to waste lands about Yarmouth.

** ATRIPLEX GLABRIUSCULA Edmonston, Fl. Shetl. 39 (1845). *A. Babingtonii* Woods, Tourist's Fl. 316 (1850). For detailed synonymy see Moss, Camb. Brit. Fl. ii. 177 (1914).

A. glabriuscula, a species of northwestern Europe—Scandinavia, Denmark, north Germany and France to the Faeröes and Iceland—recognized (usually as *A. Babingtonii*) by such conservative European systematists as Britten & Rendle, Druce, Moss, Hartman, Rouy and Ascherson & Graebner, is abundant on the sandy and gravelly sea-shores from Newfoundland to Maine and very locally to Rhode Island, and casual on ballast southward. It is one of the maze of plants passing as *A. patula* and *A. hastata*. The latter, probably best considered as variations of one species, have the spiciform branches of the inflorescence naked except at base, the freely tuberculate bracteoles 1–5 mm. long (except in the rare *A. patula*, var. *bracteata* with bracteoles 1–1.5 cm. long), and the seeds 1–2 mm. in diameter. *A. glabriuscula*, on the other hand, has leafy-bracted inflorescences, large and less tuberculate fruiting bracteoles (0.5–1.2 cm. long) and seeds 2–4 mm. in diameter. In America *A. glabriuscula* is so clearly restricted to the region from Newfoundland to New England, where so many identities with the flora of north-western Europe are known, while the semi-cosmopolitan *A. patula* crosses the continent, that there is little question that we should recognize it as a distinct species. A few immature herbarium-specimens can-

not be satisfactorily placed but all fully mature specimens seem to be clearly either *A. patula* (including *A. hastata*) or *A. glabriuscula*. *A. glabriuscula*, at least in Nova Scotia, matures much earlier than *A. patula* and its var. *hastata*. The following American specimens are referred to

A. GLABRIUSCULA Edmonston. NEWFOUNDLAND: sea-beach, Middle Arm, Bay of Islands, August 22, 1896, *Waghorne*, no. 49; damp sandy shores, St. George's, August 13, 1910, *Fernald & Wiegand*, no. 3318. QUEBEC: marshy shore, Pointe au Maurier, Charnay, Saguenay Co., August 27, 1915, *St. John*, no. 90,408; sea-strand, Ile Herbée, Archipel du Vieux-Fort, July 24, 1915, *St. John*, no. 90,409; Anticosti, August 1, 1861, *Hyatt, Shaler & Verrill;* Anse au Sanatorium, Anticosti, August 20, 1917, *Fr. Marie-Victorin*. MAGDALEN ISLANDS: Brion Island, August 13, 1914, *St. John*, no. 1863; rivages, Ile du Hâvre-aux-Maisons, August 15, 1919, *FF. Marie-Victorin & Rolland-Germain*. NOVA SCOTIA: gravelly beach of Great Bras d'Or, Kidstone Island, August 28, 1920, *Fernald & Long*, nos. 21,149, 21,151; pebbly shore, Purcell's Cove, Halifax, September 2–6, 1901, *Howe & Lang*, no. 1503; damp sand-flats, Central Port Mouton, *Fernald, Bissell, Graves, Long & Linder*, no. 21,444; upper border of gravelly strand, Villagedale, August 7, 1920, *Fernald, Long & Linder*, no. 21,141; damp sand-flat back of beach, Sand Beach, Yarmouth Co., August 10 and September 7, 1920, *Fernald, Long & Linder*, nos. 21,142, 21,152; cobbly barrier beach, Pembroke Shore, July 5, 1920, *Long & Linder*, no. 21,140, October 6, *Fernald & Linder*, nos. 21,155, 21,156, 21,157. MAINE: railroad yard (introduced), Fort Fairfield, September 19, 1900, *Fernald;* strand, Pleasant Point, Perry, August 16, 1909, *Fernald;* strand, Carlow Island, Passamaquoddy Bay, August 16, 1909, *Fernald;* Cutler, August 27, 1902, *Kate Furbish;* Cross Island, August, 1892, *F. L. Harvey;* sandy beach, Great Wass Island, Jonesport, August 5, 1907, *Cushman & Sanford*, no. 1471; beach, Great Cranberry Isle, September 5, 1891, *Rand;* east shore of Little Cranberry Isle, August 6, 1889, *Redfield;* Sorrento, 1891, *Kate Furbish;* Swan's Island, August, 1911, *Kate Furbish;* Matinicus, 1918, *C. A. E. Long*, no. 64; open sand, sea-shore, Pemaquid Beach, Bristol, September 9, 1898, *Chamberlain;* gravelly shore, Southport, August 3, 1894, *Fernald;* Fort Popham, Phippsburg, September 7, 1907, *Kate Furbish;* Wells, 1898, *Kate Furbish*. MASSACHUSETTS: beach, Nahant, September 16, 1894, *Williams;* salt marsh, Seaview, October 4, 1896, *Williams;* beach near Eel River, Plymouth, September 23, 1853, *Wm. Boott;* southwestern section of Barnstable, September 16–17, 1918, *Bean, Bird & Knowlton*. RHODE ISLAND: Tiverton, September 27, 1903, *Williams;* seashore, Middletown, August 24, *M. B. Simmons*. PENNSYLVANIA: ballast, Greenwich Point, Philadelphia, August 25–October 1, 1874, *C. F. Parker*.

** A. PATULA L., var. BRACTEATA Westlund, Sveriges Atripl. 57 (1861); Moss, Cambr. Brit. Fl. ii. 174, t. 176 (1914). An extreme variation of northern Europe, with elongate bracteoles up to 1–1.5 cm. long, even longer than in *A. glabriuscula,* but with nearly naked inflorescence and small seed. Known in North America only from a single specimen collected in brackish or saline marsh near mouth of George River, Cape Breton.

SPERGULARIA SALINA J. & C. Presl.; Fernald & Wiegand, RHODORA, xii. 162 (1910). Occasional on saline shores.

S. LEIOSPERMA (Kindb.) F. Schmidt; Fernald & Wiegand, l. c. Occasional on saline shores.

SAGINA NODOSA (L.) Fenzl, var. PUBESCENS Mert. & Koch. Sand-flats, Queens and Shelburne Cos. See pp. 150, 158.

ARENARIA PEPLOIDES L., var. ROBUSTA Fernald, RHODORA, xi. 114 (1909). So far as we observed, on many beaches from Yarmouth to Cape Breton, this is the only variety of the species in the province.

STELLARIA ULIGINOSA Murr. Wet sand and springy spots at various stations in Digby and Victoria Cos.

S. LONGIFOLIA Muhl. COLCHESTER Co.: wet sandy margin of pool in flood-plain of Salmon River, Truro. Macoun reports the species as common but his records were based largely on the introduced weed, *S. graminea.*

* *Lychnis Flos-cuculi* L. Swale, Yarmouth.

** *Silene gallica* L. Railroad yard, Digby. Collected in the same locality in August, 1902, by the late Geo. E. Morris. See p. 94.

* *Dianthus Armeria* L. DIGBY Co.: rather scarce, on a clayey roadside bank, Sandy Cove.

* NYMPHOZANTHUS RUBRODISCUS (Morong) Fernald, RHODORA, xxi. 187 (1919). Lakes and quiet streams, Yarmouth Co. to Hants Co. Collected by Howe & Lang in Pictou Co. See p. 137.

* NYMPHAEA ODORATA Ait., var. ROSEA Pursh. See p. 161. Bog-pools and lake-margins, Digby and Yarmouth Cos.

BRASENIA SCHREBERI Gmel. In various lakes of Yarmouth Co.

RANUNCULUS PURSHII Richardson. Shallow water and open swamps, Cumberland Co. to Cape Breton and Hants Co. See pp. 131, 133, 164, 170.

* R. FLAMMULA L.; Fernald, RHODORA, xix. 135 (1917). YARMOUTH Co.: in a cold spring-brook, Tusket. See p. 157.

R. ABORTIVUS L. Not seen west of Hants Co. See p. 133.

R. RECURVATUS Poir. Rich woods, Cumberland Co. to Cape Breton and Annapolis Co. See pp. 136, 164, 170.

Chelidonium majus L. About an old cellar-hole, Arcadia, Yarmouth Co.

Lepidium campestre (L.) R. Br. Waste land, Yarmouth.

* *L. Draba* L. Roadsides, waste places and ballast lands, Yarmouth, scarce. See p. 140.

Coronopus didymus (L.) Sm. Waste ground, railroad yards, etc., Digby, Yarmouth and Sand Beach (Yarmouth Co.). See p. 140.

* Subularia aquatica L. Sandy and gravelly bottoms of lakes. Yarmouth Co.: Jassy Lake, Lake Annis; Salmon (Greenville) L.; Clearwater L., Belleville; Frost L., Argyle; Great Pubnico L. Shelburne Co.: Clement Pond, Barrington. Victoria Co.: Warren L., Ingonish, *J. R. Churchill*. See pp. 142, 143, 151, 156.

* *Camelina microcarpa* Andrz. Casual weed of railroad yards.

* *Neslia paniculata* (L.) Desv. Casual weed of railroad yards and waste places, nowhere abundant but often seen in small quantity.

* *Conringia orientalis* (L.) Dumort. Casual in railroad yards.

* *Sisymbrium officinale* (L.) Scop. Occasional weed in Digby, Yarmouth and Queens Cos. Var. *leiocarpum* DC. was not seen. See p. 140.

* *Erysimum parviflorum* Nutt. Cumberland Co.: gravelly railroad yard, Springhill Junction. See p. 132.

Dentaria diphylla Michx. Annapolis Co.: brookside in mixed woods, southern slope of North Mt., near Middleton. Hants Co.: rich woods near gypsum cliffs along Five-Mile River. See pp. 137, 140, 170.

Drosera longifolia L. *D. intermedia* Hayne. The great abundance of this species in wet peaty and sandy soils from Yarmouth to Annapolis Co. makes it difficult to understand Dr. C. B. Robinson's belief that in Nova Scotia this species is restricted to Cape Breton (see p. 90).

** Drosera **longifolia** × **rotundifolia**, n. hybr., petiolis sparse pilosis, laminis late obovatis.

Petioles sparingly pilose; blades broadly obovate.—Nova Scotia: with the two parents and exactly intermediate between them, on a knoll in wet peaty slough in barrens, Lower Argyle, August 11, 1920, *Fernald, Bissell, Graves, Long & Linder*, no. 21,349 (type in Gray Herb.). See p. 155.

Tillaea aquatica L. Shelburne Co.: damp sand-flats back of beach, Villagedale. See p. 150.

Sedum acre L. Shelburne Co.: ledgy roadside, Barrington.

S. stoloniferum Gmel. Spreading to rocky or gravelly roadsides at many points in Digby, Yarmouth and Shelburne Cos. See p. 94.

S. roseum (L.) Scop. Digby Co.: basaltic cliffs by Bay of Fundy, Sandy Cove. See p. 163.

** Hamamelis virginiana L., var. parvifolia (Nutt.) T. & G. Fl. i. 597 (1840). A very striking extreme of the species with the comparatively small and thick leaves densely stellate-hirsute and usually rufescent beneath. Described by Nuttall from Pennsylvania, and cited by Torrey & Gray from Louisiana, but the shrub occurs northward into New England and Nova Scotia. The following are characteristic specimens. Nova Scotia: thickets bordering

Great Pubnico Lake, September 6, 1920, *Fernald, Long* & *Linder*, no. 21,395; bank of East Branch of Tusket River, Quinan, October 8, 1920, *Fernald* & *Linder*, no. 21,396. Maine: damp woods, Orono, September, 1887, *Fernald;* South Poland, October, 1893, *Furbish;* Brunswick, August 26, 1913, *Furbish.* Vermont: Rutland, October 3, 1898, *Eggleston.* Massachusetts: Georgetown, *C. N. S. Horner;* damp rocky woods, West Roxbury, October 10, 1896, *W. P. Rich;* low woods, Montague, May 11, 1912, *Wheeler* & *Wiegand.*

* Ribes hirtellum Michx., var. calcicola Fernald, Rhodora, xiii. 76 (1911). Commoner in Nova Scotia than the typical form of the species. The varietal designation a misnomer.

R. lacustre (Pers.) Poir. Swampy woods, Cumberland Co. to Hants Co. and Cape Breton.

R. triste Pallas, var. albinervium (Michx.) Fernald. Rich low woods, Cumberland Co. to Hants Co. and Cape Breton.

** Pyrus arbutifolia (L.) L. f. Frequent in Yarmouth Co.: sterile meadows, Arcadia; gravelly thicket by Salmon (Greenville) Lake; thicket by Butler's (Gavelton) L.; thicket by Great Pubnico L. Fruit cherry-red, maturing later than that of the commoner P. arbutifolia, var. atropurpurea (Britton) Robinson. See p. 156.

P. **dumosa** (Greene) n. comb. *Sorbus Aucuparia, β.* Michx. Fl. Bor.-Am. i. 290 (1803). *P. sambucifolia* of Eastern American records, not C. & S. *P. americana,* var. *decora* Sarg. Silva, xiv. 101 (1892). *S. dumosa* Greene, Pittonia, iv. 129 (1900). *S. scopulina* Greene, l. c. 130 (1900). *S. subvestita* Greene, l. c. (1900). *Pyrus sitchensis* Piper, Mazama, ii. 107 (1901) in part, not *Sorbus sitchensis* Roem. *S. decora* (Sarg.) Schneider, Bull. Herb. Boiss. sér. 2, vi. 313 (1906). —Apparently throughout, but less common than *P. americana.*

Sorbus sitchensis Roem. Syn. Mon. iii. 139 (1847), the nomenclatorial basis of *Pyrus sitchensis* (Roem.) Piper, with which our shrub and small tree has been recently identified, proves, according to Rehder, to be the *S. pumila* Raf. which was later described as *P. occidentalis* Watson. This species certainly has little to do with our large-fruited tree and shrub; but there seems to be no specific distinction between the common Rocky Mountain species and ours.

Frère Arsène has collected on Miquelon a hybrid of *P. americana* with *P. arbutifolia,* var. *atropurpurea.* Similar hybrids of *P. americana* or the introduced *P. Aucuparia* with *P. arbutifolia* and *P. melanocarpa* are occasionally found in New England. Such frequent occurrences of natural hybrids between these species, which are considered by many authors as distinct genera (*Sorbus* and *Aronia*) would seem to weaken the line of separation between these "genera."

** Amelanchier stolonifera Wiegand, Rhodora, xiv. 144 (1912). Apparently not common in the province. Annapolis Co.: boggy depressions and moist thickets on sandy plains, Middleton.

** A. STOLONIFERA Wiegand, var. **lucida**, n. var., foliis crassis supra atroviridibus lucidis; ovario ad apicem glabro vel sparse pubescente.

Leaves thick, dark green and lustrous above: ovary glabrous at apex or only sparsely pubescent.—NOVA SCOTIA: dry rocky and gravelly railroad right-of-way, west of Bridgewater, July 17, 1920, *Fernald, Bissell, Pease, Long* & *Linder*, no. 21,432; slaty ledges and cobbly upper beach of Shubenacadie Grand Lake, July 19, *Fernald* & *Bissell*, no. 21,433; dry open barrens, Springhill Junction, July 18, *Pease* & *Long*, no. 21,434; dryish open sandy plain, Middleton, July 20, *Fernald, Pease* & *Long*, no. 21,435, *Bean* & *White*, no. 21,436; moist woods and thickets, Middleton, July 21, *Fernald* & *Pease*, no. 21,437 (TYPE in Gray Herb.); boggy barrens west of Goose Lake, Argyle, August 4, *Fernald* & *White*, no. 21,438; boggy barrens near Clement Pond, Barrington, August 9, *Fernald, Long* & *Linder*, no. 21,439. For further discussion see pp. 130, 135, 138.

** A. CANADENSIS (L.) Medic.; Wiegand, RHODORA, xiv. 150 (1912). HANTS CO.: talus of gypsum cliffs, Five-Mile River. See pp. 136, 170.

** A. LAEVIS Wiegand, var. **nitida** (Wiegand), n. comb. *A. laevis*, forma *nitida* Wiegand, RHODORA, xiv. 155 (1912).

This green- and lustrous-leaved extreme is so characteristic and uniform on the wooded terraces of Sissiboo River, Weymouth (nos. 21,441, 21,442) that it seemed to all members of the party who saw it a very distinct shrub. Also collected in mixed woods on the southern slope of North Mountain, Middleton, *Long*, no. 21,447.

** A. INTERMEDIA Spach; Wiegand, RHODORA, xxii. 147 (1920). Wet or dry open soil, thickets, borders of woods, etc. Common, at least from Yarmouth to Hants and Queens Cos. See p. 103.

** CRATAEGUS JONESAE Sargent. QUEENS CO.: hillside pasture, Bell Point, Port Mouton. See p. 159.

FRAGARIA VESCA L., var. AMERICANA Porter. HANTS CO.: talus of gypsum cliffs near Five-Mile River. VICTORIA CO.: rock faces and crevices of gypsum cliffs, Port Bevis. See pp. 136, 170.

* *Potentilla recta* L. DIGBY CO.: dry open fields, Digby.

P. FRUTICOSA L. YARMOUTH CO.: open spruce bog near Cedar Lake. DIGBY CO.: wet savannah along Little River east of Tiddville; dry clayey roadside, Sandy Cove. HANTS CO.: talus of gypsum cliffs near Five-Mile River. See p. 101.

* *P. Anserina* L., var. *sericea* Hayne. See Fernald, RHODORA, xi. 8 (1909). Naturalized in waste ground about wharves at Yarmouth.

P. procumbens Sibth. YARMOUTH CO.: along path in spruce and alder thicket, Lower Argyle. VICTORIA CO.: grassy road through spruce and fir woods, Baddeck. See p. 155.

** *Filipendula hexapetala* Gilib. Roadside thicket, Yarmouth.

* *F. Ulmaria* (L.) Maxim. Abundantly naturalized by roadsides about Yarmouth.

Geum canadense Jacq. Frequent in rich soil about towns, often appearing like an introduced weed. See p. 137.

G. virginianum L. Not seen west of Annapolis Co. See pp. 137, 170.

G. strictum Ait. Frequent from Annapolis Co. eastward. See p. 137.

Rubus idaeus L. See Fernald, Rhodora, xxi. 96 (1919). Well established as a garden escape about Yarmouth.

R. idaeus, var. strigosus (Michx.) Maxim.; Fernald, l. c. Frequent but apparently less common than the next.

R. idaeus, var canadensis Richardson; Fernald, l. c. 97. Frequent.

R. Chamaemorus L. Common on boggy barrens of the Atlantic slope, rare elsewhere. Digby Co.: Tiddville.

R. allegheniensis Porter. Common in dry thickets and clearings eastward at least to Halifax and Pictou Cos.

** R. glandicaulis Blanchard, var. **neoscoticus**, n. var., a forma typica recedit caulibus crassioribus; foliis supra breviter villosis, subtus densissime subvelutinis; pedicellis crassioribus rectis.

Differing from the typical form of the species in its stouter canes: leaves short-villous above, very densely almost velvety beneath: pedicels stouter, straight.—Yarmouth County, Nova Scotia: recently burned clearing near Beaver Lake, July 11, 1920, *Fernald, Bissell, Pease, Long & Linder*, no. 21,600; roadside thicket, Wellington, July 11, 1920, *Fernald, Bissell, Pease, Long & Linder*, no. 21,569 (type in Gray Herb.); rocky roadside thicket, Yarmouth, September 7, 1920, *Fernald, Long & Linder*, no. 21,603; abundant in and around Yarmouth, July 25, 1909, *W. H. Blanchard*, nos. 718, 719; dryish thickets, Sand Beach, July 12, 1920, *Fernald & Linder*, no. 21,543; dry thickets and borders of woods, Belleville, July 27, 1920, *Long & Linder*, no. 21,549; rocky clearing west of Eel Lake, July 27, 1920, *Fernald, Bean & White*, no. 21,579.

In its best development var. *neoscotica* has grayish foliage dull above, lustrous beneath, and the leaflets, especially of the new canes so full as to appear puckered or strongly rugose. Typical R. glandicaulis, which was collected by Blanchard at Granville, Annapolis Co. (no. 717), and which is frequent in southern New Brunswick and on Prince Edward Island, is a more slender plant; with the leaves glabrous and shining above, pubescent but hardly lustrous beneath, and its pedicels almost capillary and usually upwardly arching. Material from Canso (*Fowler*) is somewhat transitional.

** R. orarius Blanchard, Rhodora, viii. 169 (1906). Frequent in damp thickets of Digby, Yarmouth and Shelburne Cos. Markedly

less pubescent than *R. alleghcniensis*, though with the lower leaf-surfaces thinly velvety; the racemes (except at tip of cane) copiously leafy-bracted, and the sparingly glandular pedicels more often with scattered bristles; in these characters closely matching the series of Blanchard's Cape Porpoise specimens designated by him as the type. Heretofore known from York Co., Maine and from Cape Cod, Massachusetts. Digby Co.: rich moist open thicket by brook, Sandy Cove, *Fernald* & *Long*, nos. 21,589, 21,592, 21,602. Yarmouth Co.: gravelly shore of Lake Annis, *Bissell, Pease* & *Linder*, no. 21,568; open woods and thickets near Butler's (Gavelton) Lake, Gavelton, *Fernald, Long* & *Linder*, no. 21,609; damp rocky thicket, Pubnico, *Fernald, Long* & *Linder*, no. 21,613. Shelburne Co.: rocky spruce and alder thickets, and dry gravelly slopes, Shag Harbor, *Fernald, Bissell* & *Linder*, nos. 21,581, 21,617 and 21,628.

R. Andrewsianus Blanchard. Yarmouth Co.: open rocky woods and thickets near Butler's (Gavelton) Lake, Gavelton, *Fernald, Long* & *Linder*, no. 21,540; moist clearing in spruce woods near Randel Lake, Argyle, *Long* & *Linder*, no. 21,624.

** R. amnicola Blanchard, Rhodora, viii. 170 (1906) as *R. amnicolus*. The type collection is well matched by our material from Digby Co.: gravelly railroad bank, Digby, *Bissell, Pease, Long* & *Linder*, no. 21,625.

Brainerd & Peitersen treat *R. amnicola* as a hybrid of *R. argutus* and *R. canadensis*. As yet no typical *R. argutus* has been found in Nova Scotia, the nearest approach to it being *R. Andrewsianus* which they consider a hybrid of *R. alleghcniensis* and *R. argutus*.

R. canadensis L. Common throughout the province.

R. multiformis Blanchard. Blanchard included different plants under this name. The typical species is a very distinct low-arching or trailing, freely branching and "tipping" shrub, with remotely prickly coarse canes, glabrous leaves with caudate-tipped leaflets and very lax and elongate racemes (suggesting those of *R. elegantulus*), the filiform pedicels not bristly. The following Nova Scotia material closely matches Blanchard's type series. Kings Co.: Kentville, *Blanchard*, no. 726. Annapolis Co.: Annapolis, *Blanchard*, no. 727. Digby Co.: thickets bordering savannahs by Little River, Tiddville, *Fernald* & *Long*, no. 21,576; thickets and steep wooded banks along Sissiboo River, Weymouth, *Fernald, Bissell, Graves, Long* & *Linder*, no. 21,537; moist mixed woods and thickets, Meteghan, *Fernald* & *Long*, no. 21,560; clearings in wet spruce woods, Meteghan, *Fernald* & *Long*, no. 21,562. Yarmouth Co.: low woods and thickets by Butler's (Gavelton) Lake, Gavelton, *Fernald, Long* & *Linder*, no. 21,590; boggy clearings and borders of spruce woods, Pubnico, *Fernald, Long* & *Linder*, no. 21,611; thicket bordering Great Pubnico Lake, *Fernald, Long* & *Linder*, no. 21,539. Queens Co.: gravelly thicket near mouth of Broad River, *Fernald* & *Bissell*, no. 21,621.

This species may prove to be an extreme of *R. elegantulus*.

** R. BIFORMISPINUS Blanchard. SHELBURNE CO.: rocky spruce and alder thickets, Shag Harbor, *Fernald, Bissell & Linder*, no. 21,618.

** R. RECURVANS Blanchard. YARMOUTH CO.: upper border of cobbly beach of Tusket (Vaughan) Lake, Gavelton, *Fernald, Long & Linder*, no. 21,618; rocky clearing west of Eel Lake, *Fernald, Bean & White*, no. 21,578.

R. RECURVICAULIS Blanchard, RHODORA, viii. 153 (1906). Apparently throughout the province. The following are referred here. VICTORIA CO.: fencerows, thickets and borders of woods, Baddeck, *Fernald & Long*, no. 21,573. GUYSBOROUGH CO.: Boylston, *Hamilton*, no. 19,985 (Geol. Surv. Can. as *R. canadensis*). HALIFAX CO.: Purcell's Cove, Halifax Harbor, *Howe & Lang*, no. 1578 (as *R. Randii*); Dartmouth, *Blanchard*, nos. 735, 736. QUEENS CO.: dry border of woods, Port Mouton, *Fernald, Long & Linder*, no. 21,601. SHELBURNE CO.: spruce and maple swamp by Clement Pond, Barrington, *Fernald, Long & Linder*, no. 21,623. YARMOUTH CO.: gravelly thicket bordering Salmon (Greenville) Lake, *Fernald, Long & Linder*, no. 21,620; gravelly railroad embankment, Yarmouth, *Fernald, Long & Linder*, no. 21,605. DIGBY CO.: dry open field, Digby, *Bissell, Pease, Long & Linder*, no. 21,626. ANNAPOLIS CO.: dryish open sandy plains, Middleton, *Fernald, Pease & Long*, nos. 21,547, 21,597, 21,598.

Rydberg in the North American Flora (xxii. 474, 475) assigns *R. procumbens* Muhl. a range from "Maine to Virginia," etc., but treats *R. recurvicaulis*, which is common in Nova Scotia and Newfoundland, as *R. pergratus* × *procumbens*. In view of the fact that neither *R. pergratus* nor *R. procumbens* is known in either Nova Scotia or Newfoundland *R. recurvicaulis* would seem, by Rydberg's interpretation, to be one of the *absent treatment* hybrids so popular with many students of *Rubus*. Rydberg includes other such supposed hybrids on the same page (in view of the fact that *R. procumbens* is unknown from east of southern Maine): "*R. canadensis* × *procumbens* . . . Nova Scotia and Maine" and "*R. hispidus* × *procumbens* . . . . Nova Scotia to Vermont and Long Island, New York."

I have been unable to separate from *R. recurvicaulis*, Blanchard's *R. arenicola*, RHODORA, viii. 151 (1906) as *R. arenicolus*. See p. 138.

R. PLICATIFOLIUS Blanchard, RHODORA, viii. 149 (1906). YARMOUTH CO.: swampy woods and wet thickets by Eel Lake, *Fernald, Bean & White*, no 21,580.

* R. JUNCEUS Blanchard. YARMOUTH CO.: sphagnous swale bordering Beaver Lake, *Fernald, Bissell, Pease, Long & Linder*, no. 21,556.

R. VERMONTANUS Blanchard, Am. Bot. vii. 1 (1904). DIGBY Co.: moist thicket, Sandy Cove, *Fernald & Long*, no. 21,591; open sphagnous bog and moist thickets, Meteghan, *Fernald & Long*, nos. 21,550, 21,561; dry banks along railroad, Hectanooga, *Bissell, Pease & Linder*, no. 21,588. YARMOUTH Co.: peat bog, Pembroke Shore, *Long & Linder*, no. 21,627; dryish thickets, Sand Beach, *Fernald & Linder*, no. 21,544. SHELBURNE Co.: rocky spruce and alder thickets, Shag Harbor, and rocky railroad bank, Wood Harbor, *Fernald, Bissell & Linder*, nos. 21,582, 21,616½, and 21,639.

This material is a perfect match for Blanchard's original specimens from York County, Maine, of *R. peculiaris*, a plant which is rightly referred by Brainerd & Peitersen to *R. vermontanus*. Rydberg (No. Am. Fl. xxii. 477) treats *R. peculiaris* as a hybrid of *R. nigricans* (apparently *R. setosus* Bigel.) and *R. pergratus*, but until *R. pergratus* is found in western Nova Scotia, where *R. peculiaris* (or *R. vermontanus*) is frequent, such a disposition of it there would seem hardly satisfactory. Incidentally, *R. pergratus* has the leaves velvety beneath and coarse prickles, *R. peculiaris* glabrous leaves and fine almost bristle-like prickles.

R. TARDATUS Blanchard. One of the most characteristic "half-high" species of damp thickets. CUMBERLAND Co.: gravelly thickets south of Amherst, *Fernald*, no. 21,586. HALIFAX Co.: thicket bordering ledgy and cobbly beach of Shubenacadie Grand Lake, *Fernald & Bissell*, nos. 21,553, 21,556. ANNAPOLIS Co.: Middleton, *Blanchard*, no. 732. DIGBY Co.: clearings in wet spruce woods, Meteghan, *Fernald & Long*, no. 21,564. YARMOUTH Co.: sphagnous swale bordering Beaver Lake, *Fernald, Bissell, Pease, Long & Linder*, no. 21,571; thicket at border of sandy and peaty beach, Trefry's Lake, Arcadia, *Fernald & Long*, no. 21,606; low woods and thickets by Butler's (Gavelton) Lake, Gavelton, *Fernald, Long & Linder*, no. 21,608; thicket bordering Great Pubnico Lake, *Fernald, Long & Linder*, no. 21,612. See p. 156.

Since *R. tardatus* is a dominant and very constant species of boggy thickets and lake-margins of Nova Scotia and of Prince Edward Island, Brainerd & Peitersen's treatment of it as "*R. flagellaris* × *setosus*" seems hardly satisfactory. *R. flagellaris* is unknown from east of southern Maine and *R. setosus* is not known from Prince Edward Island (the material so referred in the 7th edition of Gray's Manual being wrongly determined) and the only plant we have from Nova Scotia which is possibly referable to it is wholly uncharacteristic and may belong to another species.

** R. ABBREVIANS Blanchard. YARMOUTH Co.: rocky roadsides and borders of woods, Yarmouth, *Pease & Long*, no. 21,585, *Fernald, Bean & White*, no. 21,545, *Fernald, Long & Linder*, no. 21,557.

More glandular and less bristly than the characteristic shrub of the upland region of New Hampshire and Vermont but seemingly referable to it. A plant of Annapolis Co.: moist woods and thickets, Middleton, *Fernald* & *Pease*, no. 21,541, is less characteristic but is temporarily referred here.

* Rubus setosus Bigel. Our only Nova Scotian material which is possibly referable to *R. setosus* is from Digby Co.: border of clearing in wet mixed woods, Hectanooga, *Long* & *Linder*, no. 21,577, a remarkably stout development, with long canes 7 mm. in diameter and with unusually firm and thickened bristles, perhaps not correctly referred to *R. setosus*.

R. arcuans Fernald & St. John, Proc. Bost. Soc. Nat. Hist. xxxvi. 78, t. 2, fig. 7 (1921). To the Nova Scotia stations originally published should be added the following. Annapolis Co.: Granville, *Blanchard*, no. 728 (as *R. biformispinus*). Yarmouth Co.: gravelly bank, Yarmouth, *Pease* & *Linder*, no. 21,584; gravelly roadside near Saller Lake, Kemptville, *Fernald* & *Linder*, no. 21,538.

** R. jacens Blanchard. Common in southern Digby and Yarmouth Cos. Digby Co.: moist thicket, Meteghan, *Fernald* & *Long*, no. 21,551. Yarmouth Co.: rocky and gravelly woods and thickets bordering Cedar Lake, *Fernald, Bissell, Pease, Long* & *Linder*, no. 21,599; damp to dryish roadside thickets, Yarmouth, *Fernald, Bean* & *White*, no. 21,546; gravelly railroad embankment, Yarmouth, *Fernald, Long* & *Linder*, no. 21,558; dry gravelly railroad embankment, Arcadia, *Pease* & *Long*, no. 21,542; gravelly thicket, Lower Argyle, *Fernald, Bissell, Graves, Long* & *Linder*, no. 21,619.

Treated by Brainerd & Peitersen as "*R. hispidus* × *setosus*." The abundance of characteristic *R. jacens* in western Nova Scotia, where *R. setosus* is excessively rare if not quite unknown, suggests that the former is now, at least, a well established species.

R. hispidus L. Common throughout.

R. hispidus, var. major Blanchard, Rhodora, viii. 213 (1906). Yarmouth Co.: rocky roadside thicket, Yarmouth, *Fernald, Long* & *Linder*, no. 21,604.

Alchemilla vulgaris L.; Fernald & Wiegand, Rhodora, xiv. 232 (1912). A very abundant and rapidly spreading weed of fields and roadsides in Digby, Yarmouth and Shelburne Cos.; not eaten by browsing animals. See p. 94.

Agrimonia gryposepala Wallr. Less common than A. striata Michx., but found in rich thickets and woods from Digby Co. to Cape Breton. See p. 146.

** *Rosa rugosa* Thunb. This familiar hardy rose, now well naturalized on the coast of New England, is likewise becoming established at Yarmouth.

Prunus serotina Ehrh. Frequent from Halifax Co. westward.

* *Lupinus polyphyllus* Lindl. See Fernald, Rhodora, xvi. 94 (1914). Very abundantly naturalized on dry roadside banks, Chebogue Point, and less abundantly at other places in Yarmouth Co. Well naturalized along gravel of Salmon River, Truro. Beginning to spread from cultivation at Baddeck. See p. 105.

L. nootkatensis Donn. See Fernald, l. c. With the preceding in great abundance at Chebogue Point, Yarmouth Co. See p. 105.

** *Trifolium pratense* L., var. *frigidum* Gaudin. Yarmouth Co.: seepy open peaty slopes, Yarmouth. See p. 95.

** *T. dubium* Sibth. Yarmouth Co.: roadsides, Darling Lake, Arcadia and Belleville. See p. 101.

** *Vicia angustifolia* (L.) Reichard, var. *uncinata* (Desv.) Rouy & Foucaud; Fernald & Wiegand, Rhodora, xii. 140 (1910). Waste places about Yarmouth. Becoming well naturalized also in eastern Maine, New Brunswick, Prince Edward Island and Newfoundland. See p. 95.

Lathyrus palustris L. See Fernald, Rhodora, xiii. 50 (1911). Queens Co.: damp dune-thicket, Central Port Mouton. The plant generally passing as *L. palustris* is var. pilosus (Cham.) Ledeb.

L. palustris, var. macranthus (T. G. White) Fernald, Rhodora, l. c. Annapolis Co.: crests of basalt cliffs by Bay of Fundy, Margaretville.

* *L. pratensis* L. Cumberland Co.: border of boggy swale, Springhill Junction. See p. 132.

Apios tuberosa Moench. Yarmouth Co.: thickets bordering Salmon (Greenville) Lake; thicket bordering beach of Butler's (Gavelton) L., Gavelton. Queens Co.: damp thicket, Central Port Mouton. Halifax Co.: gravelly thicket bordering Shubenacadie Grand Lake. See p. 147.

Amphicarpa monoica (L.) Ell. Halifax Co.: thicket bordering beach of Shubenacadie Grand Lake.

* *Geranium pratense* L. Waste ground, Yarmouth. Collected in 1913 in dry fields, Springville, Pictou Co. (*St. John*, no. 1431).

* *Euphorbia hirsuta* (Torr.) Wiegand. Railroad gravel, Weymouth and North Sydney. Doubtless more general along the railroads.

Callitriche heterophylla Pursh. All our collections of *Callitriche* from Yarmouth Co. are of this species, no *C. palustris* being noted southwest of Annapolis Co. *C. heterophylla* was collected at various stations throughout the province.

Corema Conradii Torr. Already well known from dry plains and barrens of Halifax, Kings and Annapolis Cos. Frequent in appropriate habitats in Yarmouth, Shelburne and Queens Cos. See pp. 92, 137, 138, 142, 148, 150.

Ilex verticillata (L.) Gray. The Black Alder is so exceedingly variable that it often seems as if some definite specific lines should

be found in the group. I have spent much time in studying the seeds from all ripe fruit at hand in the hope that these would furnish sound characters, but, although the seeds show great diversity in size (2.8–4.5 mm. long) and outline, these variations seem to be in no way associable with other characters or with definite ranges. Besides the typical form of the species, which is common in Nova Scotia, the following recognizable varieties occur.

** I. VERTICILLATA, var. PADIFOLIA (Willd.) T. & G. QUEENS Co.: wet boggy thickets near Louis Lake, Port Joli. See p. 159.

I. VERTICILLATA, var. TENUIFOLIA (Torr.) Wats. YARMOUTH Co.: moist, rocky wooded slope, Tusket. HALIFAX Co.: cool damp woods, Windsor Junction, *Howe & Lang*, no. 415.

** I. VERTICILLATA (L.) Gray, var. **fastigiata** (Bicknell), n. comb. *I. fastigiata* Bicknell, Bull. Torr. Bot. Cl. xxxix. 426 (1912).—YARMOUTH Co.: swampy spruce woods and thickets, southwest shore of Trefry's Lake, Arcadia; gravelly thicket by Fanning Lake, Carleton; thicket bordering Great Pubnico Lake (less characteristic form). See p. 109.

I. GLABRA (L.) Gray. Frequent or common, often dominant in spruce woods, bogs and on wet or dry barrens, Digby and Yarmouth Cos. to Halifax Co. See pp. 91, 97, 98, 105, 110, 142. 148, 158, 159, 161.

* ACER RUBRUM L., var. TRIDENS Wood. Occasional from Yarmouth Co. to Queens Co. See pp. 102, 151.

RHAMNUS ALNIFOLIA L'Hér. CUMBERLAND Co.: openings in swampy woods, Springhill Junction.

HYPERICUM BOREALE (Britton) Bicknell. Common throughout the province.

** H. DISSIMULATUM Bicknell, Bull. Torr. Bot. Cl. xl. 610 (1913). YARMOUTH Co.: boggy swale, Tusket Falls; wet moss, Argyle Head. HALIFAX Co.: gravelly beach of Third Lake, Windsor Junction. See p. 149.

** ELATINE MINIMA (Nutt.) Fisch. & Meyer; Fernald, RHODORA, xix. 13 (1917). Shallow water at sandy, muddy or gravelly margins of lakes, common in Digby, Yarmouth and Shelburne Cos. In the tidal mud of the Tusket, fruiting when only 2–3 mm. high.

Although here recorded for the first time in Canada, *E. minima* was collected by *Fernald, Long & St. John* (no. 7765) in 1912 in Lake Verde, Prince Edward Island.

LECHEA INTERMEDIA Leggett. Common in dry open soil in most silicious regions. See p. 138.

VIOLA CUCULLATA Ait., forma PRIONOSEPALA (Greene) Brainerd, RHODORA, xv. 112 (1913). Commoner than the glabrous form in Yarmouth Co.

* V. CUCULLATA, var. MICROTITIS Brainerd, l. c. DIGBY Co.:

mixed woods, Hectanooga. YARMOUTH Co.: wet thickets and woods, Yarmouth.

V. SEPTENTRIONALIS Greene. Common throughout the province.

V. FIMBRIATULA Sm. Dry open soil, Yarmouth Co. to Annapolis and Halifax Cos. See p. 138.

V. PRIMULIFOLIA L. Damp sand, gravel and peat, Yarmouth and Shelburne Cos. See p. 150.

V. INCOGNITA Brainerd. Common in wet woods and thickets.

V. INCOGNITA, var. FORBESII Brainerd, Bull. Torr. Bot. Cl. xxxviii. 8 (1911). Common, usually in drier or upland woods.

V. RENIFOLIA, var. BRAINERDII (Greene) Fernald, RHODORA, xiv. 88 (1912). Rich or calcareous woods from Annapolis Co. to Cape Breton.

V. ERIOCARPA Schwein., var. **leiocarpa** Fernald & Wiegand, n. var., ovariis capsulisque glabris.

Ovaries and capsules glabrous.—Eastern Quebec to Minnesota, south to North Carolina, Tennessee, Missouri and Kansas. TYPE: Breezy Point, Warren, New Hampshire, July 21, 1907, *E. F. Williams* in Gray Herb.

In Britton & Brown's *Illustrated Flora*, ed. 2, ii. 559, Brainerd takes up the name *Viola eriocarpa* Schwein. as the earliest specific name for the plant he had formerly called *V. scabriuscula* Schwein. and describes it as having "capsule ovoid, woolly or sometimes glabrous." This description of the fruit is certainly in accord with the specific name but it is doubtful if most botanists of the northernmost states and adjacent Canada would recognize it as applying to the common yellow violet of rich woods, which they have been accustomed to call *V. scabriuscula*. In the Maritime Provinces, Quebec, New England and New York the authors have never seen *V. eriocarpa* except with glabrous ovary and capsule; but a single specimen in the herbarium of the New England Botanical Club from Hartford County, Connecticut (Tariffville, *Winslow & Hill*) shows that the plant with woolly capsule rarely occurs in the Northeast. We have examined 154 sheets of the species in which the ovary or capsule is displayed. In 12 sheets (1 from Connecticut, 2 from the same station in Maryland, 1 from southern Ontario, 2 from Indiana, 1 from Illinois, 1 from Minnesota, 1 from Kansas, and 3 from Oklahoma) the ovary or capsule is woolly; in 2 sheets (1 from Indiana, 1 from Wisconsin) some plants have woolly, some glabrous capsules; while 140 sheets (6 from Quebec, 2 from New Brunswick, 1 from Nova Scotia, 24 from Maine, 21 from New Hampshire, 14 from Vermont, 27 from Massachusetts, 1 from Rhode Island, 8 from Con-

necticut, 5 from New York, 9 from Pennsylvania, 2 from the District of Columbia, 1 from West Virginia, 1 from Virginia, 1 from North Carolina, 1 from Indiana, 2 from Tennessee, 2 from Michigan, 1 from Wisconsin, 3 from Illinois, 1 from Minnesota, 1 from Iowa, 5 from Missouri, and 1 from Kansas) have the ovary or capsule strictly glabrous. Mr. Walter Deane informs us that in his extensive herbarium there is only one sheet of *V. eriocarpa* (and that a number from Oklahoma already checked in the Gray Herbarium) with pubescent capsules. It is thus apparent that the more widely dispersed plant has glabrous capsules and, extending far to the northeast of the nomenclatorially typical *V. eriocarpa*, is worthy varietal separation.[1]

Rather local in Nova Scotia; probably confined to the calcareous districts. Hants Co.: alluvial woods along Five-Mile River. Nichols's report of *V. canadensis* (Veg. No. Cape Breton, 283) as characterizing the climax forest of Cape Breton was based on *V. eriocarpa*, var. *leiocarpa*.

V. conspersa Reichenb. Occasional from Digby Neck to Cape Breton.

Shepherdia canadensis (L.) Nutt. To the already recorded stations on Cape Breton may be added: rock-faces and crevices of gypsum cliffs, Port Bevis. See pp. 164, 170.

** Decodon verticillatus (L.) Ell., var. laevigatus T. & G.; Fernald, Rhodora, xix. 154 (1917). Shelburne Co.: quaking peaty margin of Clement Pond, Barrington. See p. 150.

Lythrum Salicaria L. Colchester Co.: low ground by railroad, Truro.

* Rhexia virginica L. Yarmouth Co.: wet thicket-margin by Randel Lake, Argyle; sandy shore of Great Pubnico L.; peaty margin of Kegeshook L. See pp. 149, 167, 168.

Epilobium palustre L. Wet thickets and swamps, from Annapolis and Queens Cos. eastward.

E. palustre, var. monticola Haussk. Common throughout, in open bogs and damp peaty barrens.

* E. glandulosum Lehm., var. occidentale (Trel.) Fernald, Rhodora, xx. 35 (1918). Queens Co.: damp dune-thicket, Central Port Mouton, very scarce.

Circaea latifolia Hill; Fernald, Rhodora, xix. 87 (1917). *C. Lutetiana* of American authors, not L. Hants Co.: alluvial woods along Five-Mile River. See pp. 137, 170.

C. canadensis Hill; Fernald, Rhodora, l. c. *C. intermedia* Ehrh. Hants Co.: alluvial woods along Five-Mile River. See pp. 137, 170.

[1] Since the above was written, Mr. C. A. Weatherby has reported to us the typical woolly-podded *V. eriocarpa* from 2 additional stations in Connecticut.

Myriophyllum alterniflorum DC. Colchester Co.: shallow pool, flood-plain of Salmon River, Truro. See p. 133.

M. exalbescens Fernald, Rhodora, xxi. 120 (1919). Brackish water, Cape Breton: Sydney Mines and Baddeck.

M. verticillatum L., var. pectinatum Wallr. Cumberland Co.: spring-pools south of Amherst. See p. 131.

* M. Farwellii Morong. Digby Co.: muddy cove in Lily Lake, Sandy Cove. See p. 163.

* M. humile (Raf.) Morong. Valley of the Tusket River, Yarmouth Co.: peaty, sandy and muddy shores, pond-hole near head of St. John Lake, Springhaven, passing in deep water to forma natans (DC.) Fernald; tidal flats, Tusket Falls. See p. 105.

M. tenellum Bigel. Shallow water at sandy or peaty lake-margins of Yarmouth and Digby Cos. Nichols's record of *M. humile* from Cape Breton belongs here. See pp. 105, 141, 142, 143, 163.

Prosperpinaca palustris L. Yarmouth Co.: boggy swales and savannahs about Tusket (Vaughan) and Butler's (Gavelton) Lakes. See p. 165.

** × P. intermedia Mackenzie, Torreya, x. 250 (1910). Yarmouth Co.: boggy savannah by Butler's (Gavelton) Lake, Gavelton. Here as at several stations in Massachusetts and Rhode Island growing with *P. palustris* and *P. pectinata* and obviously a fertile hybrid of them. See p. 166.

** P. pectinata Lam. Yarmouth Co.: wet savannah bordering Butler's (Gavelton) Lake, Gavelton; boggy savannah bordering St. John Lake, Springhaven; peaty and muddy dried-out pond-hole near head of St. John Lake. See pp. 165, 168.

Hippuris vulgaris L. Yarmouth Co.: shallow pool, Pembroke Shore. Cumberland Co.: spring-pools south of Amherst.

Aralia racemosa L. Rich or calcareous wooded slopes, Hants Co. to Cape Breton. See p. 170.

Sanicula marilandica L. Hants Co.: alluvial woods along Five-Mile River. Cumberland Co.: swampy woods, Springhill Junction.

* S. gregaria Bicknell. Hants Co.: alluvial woods along Five-Mile River. See pp. 137, 170.

Hydrocotyle americana L. Common in Yarmouth Co.

Osmorhiza Claytoni (Michx.) Clarke. Rich, alluvial or calcareous woods, Annapolis Co. to Cape Breton. See p. 170.

O. divaricata Nutt. Annapolis Co.: brookside in mixed woods, southern slope of North Mountain, north of Middleton. Victoria Co.: open woods about bases of gypsum cliffs, Port Bevis. See pp. 140, 170.

Conium maculatum. Waste ground, Digby.

* *Levisticum officinale* (L.) Koch. Yarmouth Co.: railroad bank, Lake Annis.

** Lilaeopsis lineata (Michx.) Greene. Yarmouth Co.: rocky and muddy tidal banks of Tusket River, Tusket. See p. 110.

Coelopleurum lucidum (L.) Fernald, Rhodora, xxi. 146 (1919). Apparently common on gravelly or rocky sea-shores. See p. 99.

Conioselinum chinense (L.) BSP. Queens Co.: mossy spruce woods near mouth of Broad River. See p. 159.

Cornus rugosa Lam. *C. circinata* L'Hér. See Rehder, Rhodora, xii. 122 (1910). Open woods and talus about gypsum cliffs. Hants Co.: Five-Mile River. Victoria Co.: Port Bevis.

C. stolonifera Michx. Common from Hants Co. eastward.

* C. Amomum Mill. Victoria Co.: thicket along cold brook in woods at head of Baddeck Bay, Baddeck. See p. 164.

C. alternifolia L. f. Common from northern Digby Co. to Cape Breton. Rare in Yarmouth Co.: rocky woods near Eel Lake.

Chimaphila umbellata (L.) Nutt., var. cisatlantica Blake, Rhodora, xix. 241 (1917). Rare and local in the western counties; only scattered sterile plants found.

Pyrola secunda L., var. obtusata Turcz. Digby Co.: sphagnous spruce swamp, Hectanooga. See p. 146.

P. chlorantha Sw.; Fernald, Rhodora, xxii. 51 (1920). Annapolis Co.: mixed woods, southern slope of North Mountain, north of Middleton.

P. chlorantha, var. paucifolia Fernald, Rhodora, l. c. With the last.

** P. rotundifolia L., var. arenaria Mert & Koch; Fernald, Rhodora, xxii. 122 (1920). Infrequent in the silicious areas. Yarmouth Co.: border of dry spruce woods, Belleville. Digby Co.: open pasture, Hectanooga. Annapolis Co.: damp *Polytrichum*-covered sandy plains, Middleton. See pp. 97, 138.

P. rotundifolia L., var. americana (Sweet) Fernald, Rhodora, xxii. 122 (1920). Rare in the western counties; seen only at one station in Yarmouth Co.: wooded knoll in barrens west of Goose Lake, Argyle.

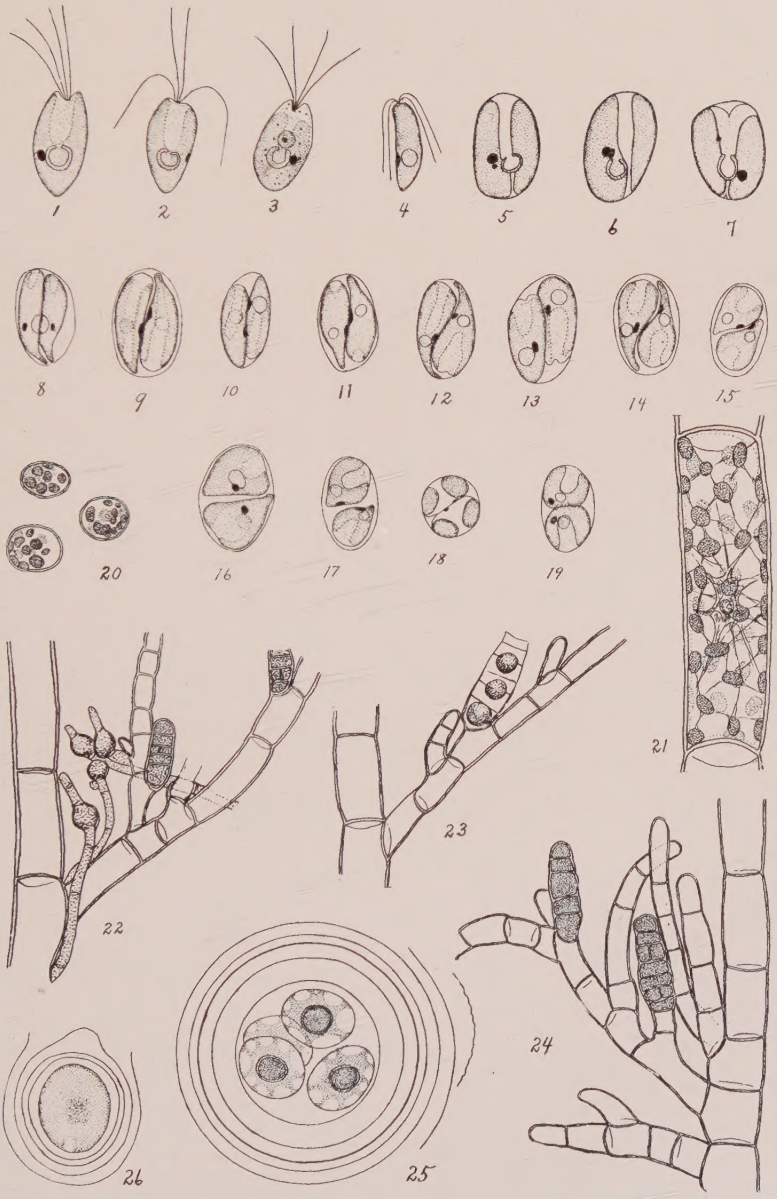
** Rhododendron canadense (L.) Torr., forma viridifolium Fernald in Wilson & Rehder, Mon. Azal. 122 (1921). Yarmouth Co.: a few scattered colonies in boggy thickets bordering Trefry's Lake, Arcadia. See p. 145.

Arctostaphylos Uva-ursi (L.) Spreng., var. coactilis Fernald & Macbride, Rhodora, xvi. 212 (1914). Noted in the western counties only on the silicious areas from Lunenburg Co. to southern Yarmouth Co.

(*To be continued.*)

Vol. 23, no. 273, including pages 201 to 220 and plate 132, was issued 9 January, 1922.

Vol. 23, no. 274, including pages 221 to 246, was issued 26th January, 1922.



Figs. 1–19. Platymonas subcordiformis.
Figs. 20–24. Ectocarpus Mitchellae var. parva
Figs. 25–26. Asterococcus superbus.

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